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"FOAM CONCRETE"

Ashwini Edtkar, Om Raut, Priyanka Jangid

Student, Civil Engineering Department,BNCOE,Pusad,Maharashtra,India,ashwiniedatkar1997@gmail.com
Student, Civil Engineering Department,BNCOE,Pusad,Maharashtra,India,omraut456@gmail.com
Student, Civil Engineering Department,BNCOE,Pusad,Maharashtra,India,jangidpriyanka323@gmail.com

Abstract

Foamed concrete has a surprisingly long history and was first patented in 1923, mainly for use as an insulation material. The first comprehensive review on foamed concrete was presented by Valore in 1954 and a detailed treatment by Rudnai the composition, properties and uses of cellular concrete, irrespective of the method of formation of the cell structure. Foam concrete is a type of porous concrete. According to its features and uses it is similar to aerated concrete.

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1. INTRODUCTION:

Foam concrete, also known as foamed concrete, foamcrete, cellular lightweight concrete or reduced density concrete, is defined as a cement based slurry, with a minimum of 20% (per volume) foam entrained into the plastic mortar As mostly no coarse aggregate is used for production of foam concrete the correct term would be called mortar instead of concrete. Sometimes it may be called as "foamed cement" or "foam cement" because of mixture of only Cement & Foam without any fine aggregate. The density of foam concrete usually varies from 400 kg/m³ to 1600 kg/ m³. The density is normally controlled by substituting fully or part of the fine aggregate with foam.

2.HISTORY:

The history of foam concrete dates back to the early 1920s and the production of autoclaved aerated concrete, which was used mainly as insulation.[2] A detailed study concerning the composition, physical properties and production of foamed concrete was first carried out in the 1950s and 60s. Following this research, new admixtures were developed in the late 1970s and early 80s, which led to the commercial use of foamed concrete in construction projects. Initially, it was used in the Netherlands for filling voids and for ground stabilisation. Further research carried out in the Netherlands helped bring about the more widespread use of foam concrete as a building material

3.MANUFACTURING:

Foamed concrete typically consists of a slurry of cement and fly ash or sand and water, although some suppliers recommend pure cement and water with the foaming agent for very lightweight mixes. This slurry is further mixed with a synthetic aerated foam in a concrete mixing plant. The foam is created using a foaming agent, mixed with water and air from a generator. The foaming agent used must be able to produce air bubbles with a high level of stability, resistant to the physical and chemical processes of mixing, placing and hardening.

Foamed concrete mixture may be poured or pumped into moulds, or directly into structural elements. The foam enables the slurry to flow freely due to the thixotropicbehaviour of the foam bubbles, allowing it to be easily poured into the chosen form or mould The viscous material requires up to 24 hours to solidify (or as little as two hours if steam cured with temperatures up to 70 °C to accelerate the process.), depending on variables including ambient temperature and humidity. Once solidified, the formed produce may be released from its mould.

4. PROPERTIES:

Foam concrete is a versatile building material with a simple production method that is relatively inexpensive compared to autoclave aerated concrete, Foam concrete compounds utilising fly ash in the slurry mix is cheaper still, and has less environmental impact. Foam concrete is produced in a variety of densities from 200 kg/m³ to 1,600 kg/m³ depending on the application. Lighter density products may be cut into different sizes. While the product is considered a form of concrete (with air bubbles replacing aggregate), its high thermal and acoustical insulating qualities make it a very different application than conventional concrete.

5.RECENT TRENDS AND DEVLOPMENT:

Until a decade ago, foam concrete has been regarded as weak and non-durable with high shrinkage characteristics. This is due to the unstable foam bubbles resulted in foam concrete having properties unsuitable for producing very low density (Less than 300 kg/m³ dry density) as well as load bearing structural applications. It is therefore important to ensure that the air entrained into the foamed concrete is contained in

stable at the same time very tiny uniform bubbles that remain intact and isolated, and do not thus increase the permeability of the cement paste between the voids.The development of synthetic-enzyme based foaming agents, foam stability enhancing admixtures and specialised foam generating, mixing and pumping equipment has improved the stability of the foam and hence foam concrete, making it possible to manufacture as light as 75 kg/m³ density. The enzyme consists of highly active proteins of biotechnological originand is not based on the unattractive protein hydrolysis. In recent years foamed concrete has been used extensively in highways, commercial buildings, disaster rehabilitation buildings, schools, apartments and housing developments in countriessuch as Germany, USA, Brazil, Singapore, India, Malaysia, Kuwait, Nigeria, Botswana, Mexico, Indonesia, Libya, Saudi Arabia, Algeria, Iraq and Egypt.

6. CONCLUSION:

From the experiments for different mixing factors, optimum mix proportion of foamed concrete is presented and the mechanical characteristics including long term behavior and the durability of developed foamed concrete with different mix proportions are also presented.